



Future long-term changes in global water resources driven by socio-economic and climatic changes

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Abstract:

A global water model is used to analyse the impacts of climate change and socio-economic driving forces (derived from the A2 and B2 scenarios of IPCC) on future global water stress. This work extends previous global water research by analysing not only the impact of climate change and population, but also the effects of income, electricity production, water-use efficiency and other driving forces, on water stress. Depending on the scenario and climate model, water stress increases (between current conditions and the 2050s) over 62.0-75.8% of total river basin area and decreases over 19.7-29.0% of this area. The remaining areas have small changes. The principal cause of decreasing water stress (where it occurs) is the greater availability of water due to increased annual precipitation related to climate change. The principal cause of increasing water stress is growing water withdrawals, and the most important factor for this increase is the growth of domestic water use stimulated by income growth. (Population growth was a much less important factor and irrigated area was assumed to remain constant.) To address the uncertainty of water stress estimates, three different indicators of water stress were computed and compared. The overlap area of their computation of "severe stress" in the 2050s was large (approximately 23×10^6 km² or 56-73% of the total "severe stress" area). This indicates a moderate level of agreement and robustness in estimates of future water stress. At the same time the indicators disagreed in many other areas, suggesting that work is still needed to elaborate general indicators and concepts of water stress.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2, SRES B2

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Security

Geographic Feature:

Climate Change and Human Health Literature Portal

resource focuses on specific type of geography

Freshwater

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Population of Concern: A focus of content

Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Low Socioeconomic Status

Resource Type:

format or standard characteristic of resource

Research Article

Socioeconomic Scenario: SES scenarios

Timescale:

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content